Formation and properties of ternary silicide (Co_xNi_{1-x})Si thin films

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Abstract:
A ternary **silicide** (Co_xNi_{1-x})Si_2 formed by **Ni** and **Co** thin films or **Ni**, **Co** and Ti thin films deposited on a Si(100) substrate is studied. The results show that a highly conductive **silicide** (Co_xNi_{1-x})Si_2 can be formed by solid phase reaction of either **Ni**/**Co**/Si or **Co**/**Ni**/Si structures. The resistivity of the **silicide** films is in the range of (15-20) μΩ.cm. The formation temperature of (Co_xNi_{1-x})Si_2 is rather low compared the **disilicides** of **Co** and **Ni**. XRD data show that (Co_xNi_{1-x})Si_2 has a CaF_2 structure its lattice constant is between that of $CoSi_2$ and $NiSi_2$. (Co_xNi_{1-x})Si_2 can also be form by rapid thermal annealing of a **Co**/**Ni**/Ti/Si multilayer structure. A quite low χ_{min} val shown by RBS/channeling investigation. The joint has a better epitaxy quality as compared with that without a Ti interlayer. It is more uniform and has a good therma stability and low resistivity. Experiments with two step annealing and chemical select etching demonstrate that a self-aligned **silicided** contact and a gate-level interconnection structure can be formed on Si wafers

Index Terms:
Rutherford backscattering channelling cobalt compounds dielectric thin films electrical resistivity etching integrated circuit interconnections lattice constants nickel compounds ra thermal annealing thermal stability 15 to 20 muohmcm $CoNiSi_2$-Si RBS Si Si(100) substr XRD channeling chemical selective etching formation temperature gate-level interconnectio structure lattice constant multilayer structure rapid thermal annealing resistivity self-aligned silicided contact solid phase reaction ternary silicide thermal stability thin films

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